North Dakota Construction Technology

Content Standards

Approved & Adopted
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INTRODUCTION TO THE CTE STANDARDS

CTE Mission

The mission of the State Board for Career and Technical Education is to work with others to provide all North Dakota citizens with the technical skills, knowledge, and attitudes necessary for successful performance in a globally competitive workplace.

Goal

Career and Technical Education (CTE) is a series of educational programs organized to prepare students for careers in their chosen fields, to take leadership roles, and to balance their multiple roles in life. The CTE goal is to create a competitive and knowledgeable work force. CTE programs prepare students with the knowledge and skills to make informed career choices, to integrate and apply academic concepts, to prepare for successful participation in a global society, and to engage in lifelong learning.

The North Dakota standards for each CTE program define expectations for student learning. These expectations guide the development of high-quality and relevant career-focused programs that are consistent across the state.

Process

Writing standards is a multi-phase process. Existing national and/or industry standards are the basis for the North Dakota program standards. In addition, standards from other states are reviewed for essential content. A team of expert secondary and postsecondary teachers, business and industry representatives, and the state program supervisor(s) draft the standards document. Once the document is finalized, the State Board for Career and Technical Education approves and adopts the standards. The standards documents are reviewed and updated on a four-year cycle. Further information on the standards can be found at: http://www.nd.gov/cte/services/standards/

Academic Integration

The Department of Career and Technical Education strongly believes in the importance of academic integration within each program. CTE courses are a vehicle by which students can apply academic knowledge to everyday life. Each standards document includes an academic cross-walk that identifies the standards in English/Language Arts, Mathematics, and Science that relate to CTE standards and can be taught or reinforced in the CTE program.

Using the Standards

Districts will use the standards as guides for developing curriculum that reflects local needs and are also tailored to prepare young people for the opportunities that exist in North Dakota and elsewhere.

Standards and Topics At A Glance

1.0 BASIC SAFETY

- 1.1 Foundations of Safety
- 1.2 Accidents: Causes and Results
- 1.3 Hazards on the Construction Job Site
- 1.4 Working Safely with Job Hazards
- 1.5 Personal Protective Equipment
- 1.6 Lifting
- 1.7 Aerial Work
- 1.8 Hazard Communication Standard
- 1.9 Fire Safety
- 1.10 Electrical Safety
- 1.11 Blood Borne Pathogens
- 1.12 Exposure
- 1.13 Construction Ergonomics
- 1.14 Heat Stress
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- 2.2 Working with Measurements
- 2.3 What are Fractions?
- 2.4 Decimals
- 2.5 Conversion Processes
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- 2.7 Introduction to Construction Geometry

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- 3.18 Torque Wrenches
- 3.19 Wedges
- 3.20 Utility Knives
- 3.21 Chain Falls and Come-Alongs
- 3.22 Wire Brushes
- 3.23 Shovels

4.0 POWER TOOLS

- 4.1 Electric, Pneumatic, and Hydraulic Tools
- 4.2 Power Drills
- 4.3 Saws
- 4.4 Grinders and Sanders
- 4.5 Miscellaneous Power Tools

5.0 INTRODUCTION TO THE BLUEPRINTS

- 5.1 Introduction to Basic Blueprint Terms, Components, and Symbols
- 5.2 Components of the Blueprint
- 5.3 Scale
- 5.4 Lines of Construction
- 5.5 Abbreviations, Symbols, and Keynotes
- 5.6 Using Gridlines to Identify Plan Locations
- 5.7 Dimensions

6.0 BASIC COMMUNICATION SKILLS

- 6.1 Foundations of Communication
- 6.2 Reading and Writing Skills
- 6.3 Listening and Speaking Skills

7.0 BASIC EMPLOYABILITY SKILLS

- 7.1 Foundations of Employability
- 7.2 The Construction Business
- 7.3 Critical Thinking Skills
- 7.4 Computer Skills
- 7.5 Relationship Skills
- 7.6 Workplace Issues

Organization of the Standards Document

Standard: provides a broad overview or general description of the content.

Topics: describe in general terms what students should know and be able to do.

Competencies: more specifically define the knowledge, skills, and practices of topics and provide the basis for measuring student learning.

Standard 2: Introduction to Construction Math	
Topic 1: Whole Numbers - Add, subtract, multiply, and divide whole numbers, with and without a calculator.	
Introductory	**Foundation**
1.1.1 List the types of mathematical procedures that trainees will use in the construction industry. 1.1.2 Explain how to count out the wrenches needed at the construction site.	2.1.1 Explain that whole numbers are numbers without fractions or decimals. 2.1.2 Explain each whole number's place value. 2.1.3 Explain that negative numbers are used to represent values less than zero. 2.1.4 Explain how to add the values of two or more numbers to find the sum. 2.1.5 Demonstrate how to subtract whole numbers. 2.1.6 Demonstrate how to multiply simple whole numbers.
Topic 2: Working with Measurements-use a standard ruler and a metric ruler to measure.	
Introductory	**Foundation**
1.2.1 Identify the types of measurement tools used in the construction trade.	1.2.2 Compare a standard ruler with a metric ruler. 1.2.3 Demonstrate the distances shown on a standard ruler, including halves, fourths, eights, and sixteenths. 1.2.4 Explain how the architect's scale can be read from left to right or from right to left.

Construction Technology Competency Categories

The competencies are further categorized into two divisions: Introductory and Fundamental.

Learners at this level **experience** acquired knowledge by **applying** it to situations and self.
Foundation

Learners at this level expand awareness and build comprehension of knowledge.
Introductory

Keys to Employability

The eight skills are based on materials gathered from the North Dakota Career Resource Network and the National Career Development Guidelines. These national skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide career and technical educators with the expectations of employers across the United States.

Basic Skills

- Reading-locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
- Writing-communicates thoughts, ideas, information, and messages in writing; creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
- Arithmetic/Mathematic – performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques.
- Listening – receives, attends to, interprets, and responds to verbal messages and other cues.
- Speaking – organizes ideas and communicates orally.

Personal Qualities

- Responsibility – exerts a high level of effort and perseveres towards goal attainment.
- Self-Esteem – believes in own self worth and maintains a positive view of self.
- Sociability – demonstrates understanding, friendliness, adaptability, empathy and politeness in group setting.
- Self Management – assess self accurately, sets personal goals, monitors progress, and exhibits self-control.
- Integrity/Honesty – chooses ethical courses of action.

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Keys to Employability (Continued)
Technology • Selects Technology – chooses procedures, tools or equipment including computers and related technologies. • Applies Technology – understands overall intent and proper procedures for setup and operation of equipment. • Maintains and Troubleshoots Equipment – prevents, identifies, or solves problems with equipment, including computers and other technologies.
Systems • Understands Systems - knows how social, organizational, and technological systems work and operates them effectively. • Monitors and Corrects Performance - distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions. • Improves or Designs Systems - suggests modifications to existing systems and develops new or alternative systems to improve performance.
Thinking Skills • Creative thinking –generates new ideas. • Decision making – specifies goals. • Problem Solving – recognizes problems and devises and implements plan of action. • Seeing Things in the Mind's Eye – organizes, processes symbols, pictures, graphs, objects and other information. • Knowing How to Learn – uses efficient learning techniques to acquire and apply new knowledge and skills. • Reasoning – discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.
Resources • Time – selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules. • Money – uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives. • Material and Facilities – acquires, stores, allocates, and uses materials or space efficiently. • Human Resources – assesses skills and distributes work accordingly, evaluates performance and provides feedback.
Information • Acquires and Evaluates Information. • Organizes and Maintains Information. • Interprets and Communicates Information. • Uses Computers to Process Information.
Interpersonal • Participates as a Member of a Team - contributes to group effort. • Teaches Others New Skills • Serves Client/Customers - works to satisfy customer's expectations. • Exercises Leadership - communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies. • Negotiates - works toward agreements involving exchange of resources; resolves divergent interests. • Works with Diversity - works well with men and women from diverse backgrounds.

Standard 1: Basic Safety	
Topic 1: Foundations of Safety	
Introductory	**Foundation**
	1.1.1 Discuss the importance of working safely. 1.1.2 Explain problems that can result if proper procedures are not followed. 1.1.3 Describe the role of Occupational Safety and Health Administration (OSHA).
Topic 2: Accidents: Causes and Results-explain the appropriate safety precautions to take around common job-site hazards.	
Introductory	**Foundation**
	1.2.1 Explain the causes of accidents, unsafe work habits, and their preventions. 1.2.2 Explain how each good housekeeping rule helps to prevent accidents. 1.2.3 Discuss company safety policies and OSHA regulations. 1.2.4 Describe the importance of reporting all injuries, accidents, and incidents. 1.2.5 Explain the procedures and signals needed for an evacuation.
Topic 3: Hazards on the Construction Job Site-explain the appropriate safety precautions to take around common job-site safety hazards.	
Introductory	**Foundation**
	1.3.1 Discuss the potential job site hazards and possible solutions. 1.3.2 Define the importance of safety in weld and flame cutting. 1.3.3 Describe the PPE necessary when arc welding and flame cutting. 1.3.4 Explain trenches and excavation safety practices. 1.3.5 Explain the hazards associated with proximity work and confined spaces. 1.3.6 List the types of vehicles used on a job site and their safe operation.
Topic 4: Working Safely with Job Hazards-explain the appropriate safety precautions to take around common job-site hazards.	
Introductory	**Foundation**
	1.4.1 Explain and use lock-out/tagout systems. 1.4.2 Explain the types of barriers and barricades.
Topic 5: Personal Protective Equipment-demonstrate the use and care of appropriate personal protective equipment (PPE).	
Introductory	**Foundation**
	1.5.1 Describe and use PPE (e.g., eye protection, ear protection, hard hat, personal fall protection, respiratory protection, etc.) 1.5.2 Demonstrate the proper use and care of PPE.

Topic 6: Lifting-follow the safety procedures required for lifting heavy objects.	
Introductory	**Foundation**
	1.6.1 List and demonstrate the procedures used to lift safely.
Topic 7: Aerial Work-describe safe behavior on and around ladders and scaffolds.	
Introductory	**Foundation**
	1.7.1 Identify the different types of ladders. 1.7.2 Discuss ladder safety and inspection. 1.7.3 Explain scaffolding systems. 1.7.4 Discuss OSHA scaffold standards and safe use.
Topic 8: Hazard Communication Standard-explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs).	
Introductory	**Foundation**
	1.8.1 Identify information on the material safety data sheet (MSDS). 1.8.2 Describe one's responsibilities under HazCom.
Topic 9: Fire Safety-describe fire prevention and firefighting techniques.	
Introductory	**Foundation**
	1.9.1 Describe the fire triangle, and explain how each element needs to be present for a fire to start. 1.9.2 List the basic safety guidelines for fire prevention. 1.9.3 Discuss the general fire precautions to ensure that a workplace is safe from fire. 1.9.4 Identify each class of fire.
Topic 10: Electrical Safety-define safe work procedures to use around electrical hazards.	
Introductory	**Foundation**
	1.10.1 Explain electrical theory. 1.10.2 Define safe work procedures to use around electrical hazards. 1.10.3 Explain proper procedures for electrical shock.
Topic 11: Blood borne Pathogens (29 CFR 1910.1030)	
Introductory	**Foundation**
	1.11.1 Explain what blood borne pathogens are. 1.11.2 Discuss the importance of avoiding blood contact with others. 1.11.3 Discuss the danger associated with chemical splashes. 1.11.4 Locate the showers and eye washes and explain how to use them.

Topic 12: Exposure	
Introductory	**Foundation**
	1.12.1 Define exposure. 1.12.2 Explain what target organs are.
Topic 13: Construction Ergonomics	
Introductory	**Foundation**
	1.13.1 Define ergonomics. 1.13.2 Explain how proper work practices can benefit one's long-term health.
Topic 14: Heat Stress	
Introductory	**Foundation**
	1.14.1 Discuss the signs of heat stress, heat cramps, and heat stroke. 1.14.2 Explain how to recognize, prevent, and respond to heat stress. 1.14.3 Discuss the importance of seeking immediate medical attention to heat exhaustion and heat stroke.
Topic 15: Cold Stress	
Introductory	**Foundation**
	1.15.1 Discuss the signs of cold stress, frostbite, and hypothermia. 1.15.2 Explain how to recognize, prevent, and respond to these conditions. 1.15.3 Discuss the importance of seeking immediate medical attention for hypothermia and frostbite.
Topic 16: Signs	
Introductory	**Foundation**
	1.16.1 Discuss the use of signs, signals, barricades, tags, and markers. 1.16.2 Explain the uses of various types of signs.
Topic 17: Tags	
Introductory	**Foundation**
	1.17.1 Explain the uses of various tags, and identify the colors and shapes that denote various hazards.
Topic 18: Utility Markers	
Introductory	**Foundation**
	1.18.1 Discuss the use of utility markers. 1.18.2 Explain why utility owners should be contacted before digging work begins. 1.18.3 Discuss the color coding used in one's area.

Topic 19: Signals	
Introductory	**Foundation**
	1.19.1 Discuss signal talk. 1.19.2 Discuss company and task-specific signals used on job sites.
Topic 20: Materials Handling and Storage	
Introductory	**Foundation**
	1.20.1 Define materials handling. 1.20.2 Explain the difference between manual and mechanical materials handling.
Topic 21: Mobile and Heavy Equipment	
Introductory	**Foundation**
	1.21.1 Define mobile equipment and heavy equipment. 1.21.2 Identify that special training and authorization are mandatory for operating mobile and heavy equipment. 1.21.3 Discuss the general guidelines for the operation of mobile and heavy equipment. 1.21.4 Discuss the safety guidelines for operating and working around heavy equipment. 1.21.5 Discuss stability control as it relates to heavy and mobile equipment. 1.21.6 Discuss the safety guidelines relevant to trucks, cars, front-end loaders, bulldozers, forklifts, and any other heavy or mobile equipment frequently used on job sites.
Topic 22: Cranes, Hoists, and Lifting Devices	
Introductory	**Foundation**
	1.22.1 Explain that crane operations have very specific usage and inspection requirements, safety guidelines, and equipment. 1.22.2 Discuss the guidelines for safe crane operations. 1.22.3 Explain the safety guidelines for safe mechanical materials handling.
Topic 23: Rigging	
Introductory	**Foundation**
	1.23.1 Define rigging. 1.23.2 Explain the safety guidelines for rigging operations. 1.23.3 Discuss proper methods of rigging. 1.23.4 Identify the various components of a rigging operation in use. 1.23.5 Discuss hooks, shackles, beam clamps, chain falls, hoists, and slings. 1.23.6 Describe the individual functions of safety guidelines of hooks, shackles, beam clamps, chain falls, hoists, and slings. 1.23.7 Explain why hand signals are used. 1.23.8 Demonstrate some common rigging hand signals.

Standard 24: Emergency Response	
Introductory	**Foundation**
	1.24.1 Discuss the importance of knowing a company's emergency response procedures. 1.24.2 Identify whom to report accidents, incidents, and emergencies; where to go in case of an emergency; where to go for medical assistance; how to locate the nearest escape route; and how evacuations are announced. 1.24.3 Explain what a company-specific employee emergency action plan is. 1.24.4 Explain the roles of emergency-response team members. 1.24.5 Discuss what to do in different types of emergencies.
Standard 25: Specialty Work	
Introductory	**Foundation**
	1.25.1 Discuss the types of specialty work done on the job site. 1.25.2 Discuss the safety guidelines for steel erection and concrete work. 1.25.3 Discuss the PPE needed for concrete work. 1.25.4 Explain what a zero-injury work environment is. 1.25.5 Identify that it is up to each individual on the job site to make it a safe place to work. 1.25.6 Identify that each worker has a responsibility to do his/her best to keep others and themselves safe. 1.25.7 Discuss the ten basic rules of safety.

Standard 2: Introduction to Construction Math	
Topic 1: Whole Numbers - add, subtract, multiply, and divide whole numbers, with and without a calculator.	
Introductory	**Foundation**
2.1.1 List the types of mathematical procedures that trainees will use in the construction industry. 2.1.2 Explain how to count out the wrenches needed at the construction site.	2.1.3 Explain that whole numbers are numbers without fractions or decimals. 2.1.4 Explain each whole number's place value. 2.1.5 Explain that negative numbers are used to represent values less than zero. 2.1.6 Explain how to add the values of two or more numbers to find the sum. 2.1.7 Demonstrate how to subtract whole numbers. 2.1.8 Demonstrate how to multiply simple whole numbers. 2.1.9 Solve multiplication problems using larger whole numbers. 2.1.10 Review the procedure to solve complicated division problems using long division. 2.1.11 Divide complex whole numbers. 2.1.12 Demonstrate how to identify and use the functions of a calculator. 2.1.13 Explain how to divide using a calculator, and review the procedure to express remainder as a whole number.
Topic 2: Working with Measurements - use a standard ruler and a metric ruler to measure.	
Introductory	**Foundation**
2.2.1 Identify the types of measurement tools used in the construction trade.	2.2.2 Compare a standard ruler with a metric ruler. 2.2.3 Demonstrate the distances shown on a standard ruler, including halves, fourths, eights, and sixteenths. 2.2.4 Explain how the architect's scale can be read from left to right or from right to left. 2.2.5 Demonstrate how to use the architect's scale on a blueprint.

Topic 3: What are Fractions? - add, subtract, multiply, and divide fractions.	
Introductory	**Foundation**
	2.3.1 Explain how fractions divide whole units into parts. 2.3.2 Demonstrate how to find equivalent fractions. 2.3.3 Demonstrate how to use division to reduce a fraction to its lowest term. 2.3.4 Use the steps to find the lowest common denominator. 2.3.5 Demonstrate how to add fractions. 2.3.6 Compare the procedure for adding fractions to the procedure for subtracting fractions. 2.3.7 Demonstrate how to subtract a fraction from a whole number. 2.3.8 Demonstrate how to multiply fractions. 2.3.9 Explain the difference between dividing and multiplying fractions. 2.3.10 Explain how to convert mixed numbers to improper fractions. 2.3.11 Demonstrate how to divide fractions.
Topic 4: Decimals - add, subtract, multiply, and divide decimals, with and without a calculator.	
Introductory	**Foundation**
	2.4.1 Explain how to read a machinist's rule. 2.4.2 Locate measurements on a machinist's rule. 2.4.3 Compare whole number place values with decimal places. 2.4.4 Demonstrate how measurements are read in the field. 2.4.5 Compare whole numbers with decimals. 2.4.6 Demonstrate how to add and subtract decimals. 2.4.7 Demonstrate how to multiply decimals. 2.4.8 Identify the three types of division problems involving decimals. 2.4.9 Demonstrate how to divide with decimals. 2.4.10 Demonstrate how to round decimals to the nearest tenth. 2.4.11 Demonstrate how to use the calculator to perform decimal operations.
Topic 5: Conversion Processes - convert fractions to decimals and decimals to fractions.	
Introductory	**Foundation**
	2.5.1 Use the proper procedures to convert decimals to percentages. 2.5.2 Use the steps to change fractions to decimals. 2.5.3 Demonstrate how to express decimals in words. 2.5.4 Demonstrate how to convert decimals to fractions. 2.5.5 Demonstrate how to convert inches to decimal equivalents in feet. 2.5.6 Demonstrate how to convert inches to decimals.

Topic 6: Introduction to the Metric System - recognize and use metric units of length, weight, volume, and temperature.	
Introductory	**Foundation**
	2.6.1 Identify examples of common measurements using the metric system. 2.6.2 Explain how to read measurements on a metric ruler. 2.6.3 Explain how to convert inches to yards. 2.6.4 Demonstrate how to move the decimal point to find how many meters are in a specific number of centimeters. 2.6.5 Identify the basic prefixes used in the metric system. 2.6.6 Demonstrate how to convert metric measurements within the metric system.
Topic 7: Introduction to Construction Geometry - recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.	
Introductory	**Foundation**
	2.7.1 Identify the various types of angles. 2.7.2 Identify the vertex of the angles. 2.7.3 Demonstrate how to measure angles using a protractor. 2.7.4 Identify common shapes. 2.7.5 Explain how to cut a rectangle on the diagonal to produce two right angles. 2.7.6 Explain how to determine whether a piece of sheathing is a true rectangle. 2.7.7 Explain how cutting a square on the diagonal produces two right angles. 2.7.8 Demonstrate how to determine the perimeter of a rectangle or square by measuring or adding the outside lines. 2.7.9 Demonstrate how to use the Pythagorean formula on a right triangle. 2.7.10 Identify that the sum of the three angles of a triangle equals 180 degrees. 2.7.11 Identify the circumference, diameter, and radius of a circle. 2.7.12 Demonstrate how to use formulas to find the circumference of a variety of circles. 2.7.13 Explain when and how to measure the surface of an object by calculating the area of a shape. 2.7.14 Identify the right, equilateral, isosceles, and scalene triangles used in construction. 2.7.15 Identify the cubic units of measure used to describe the volume of different spaces. 2.7.16 Use procedures to determine the volume of a rectangle and the volume of a square. 2.7.17 Explain how to calculate the volume of a cube. 2.7.18 Explain how to find the volume of cylinder. 2.7.19 Demonstrate how to calculate the volume of shapes.

Standard 3: Introduction to Hand Tools - introduce basic hand tools used in construction and maintenance**.**	
Topic 1: Hammers	
Introductory	**Foundation**
3.1.1 Discuss the consequences of failing to focus when using a hammer.	3.1.2 Describe the uses of a claw hammer. 3.1.3 Demonstrate how to drive a nail and to pull a nail. 3.1.4 Explain why a ball peen hammer with a cast head should not be used. 3.1.5 Discuss the consequences of striking the head of a hammer with another hammer. 3.1.6 Explain the procedures to use a ball peen hammer. 3.1.7 Demonstrate how to properly grip the handle of the hammer. 3.1.8 Discuss the relationship between distance and force when using a hammer. 3.1.9 Identify tips for maintaining and safely using hammers. 3.1.10 Demonstrate how to properly use a claw hammer, a ball peen hammer, and a mallet.
Topic 2: Screwdrivers	
Introductory	**Foundation**
	3.2.1 Compare the common types of screw heads. 3.2.2 Discuss methods to select the appropriate screwdriver for a particular screw. 3.2.3 Explain how to ensure correct fit. 3.2.4 Explain the problems that could result from using a dirty screwdriver. 3.2.5 Practice using a screwdriver without stripping the screw head. 3.2.6 Explain how to prevent the blade from slipping when starting a screw. 3.2.7 Discuss procedures for maintaining and safely using screwdrivers. 3.2.8 Discuss that a screw should not be used as an electrical tester.
Topic 3: Sledgehammers	
Introductory	**Foundation**
	3.3.1 Discuss the difference between double-face and cross peen sledgehammers. 3.3.2 Demonstrate the correct way to secure an object before hitting it with a sledgehammer. 3.3.3 Explain how to use a long-handled sledgehammer. 3.3.4 Discuss the importance of using two hands when holding a sledgehammer. 3.3.5 Discuss the consequences of swinging a sledgehammer behind your body or head. 3.3.6 Explain considerations for maintaining and safely using sledgehammers. 3.3.7 Explain how to use the right amount of force for the job.

Topic 4: Ripping Bars and Nail Pullers	
Introductory	**Foundation**
	3.4.1 Discuss the tools that are used to rip and pry apart woodwork. 3.4.2 Use the procedures for safely using a ripping bar. 3.4.3 Demonstrate how to pull nails using a cat's paws, chisel bars, and flat bars. 3.4.4 Discuss the importance of protecting yourself from debris when using a ripping bar or nail puller. 3.4.5 Explain how most accidents occur when using nail pullers.
Topic 5: Pliers and Wire Cutters	
Introductory	**Foundation**
	3.5.1 Identify the common types of pliers. 3.5.2 Explain why pliers cannot be used on nuts or bolt heads. 3.5.3 Explain the procedure to use slip-joint, long-nose, lineman, tongue-and-groove, and Vise-Grip pliers. 3.5.4 Discuss the type of tasks for which each plier (slip-joint, long-nose, lineman, tongue-and-groove, and Vise-Grip pliers) is used. 3.5.5 Demonstrate how to place the jaws of the different pliers on the objects to be held. 3.5.6 Demonstrate how to cut, hold, and bend wire using the different types of pliers. 3.5.7 Discuss safety procedures for avoiding injuries when using pliers. 3.5.8 Explain why one should never rock pliers from side to side when cutting.
Topic 6: Rulers and Other Measuring Tools	
Introductory	**Foundation**
3.6.1 Use basic measuring tools and determine how to select the proper tool for the job.	3.6.2 Explain why thin rulers measure more accurately. 3.6.3 Identify the four sets of marks on a steel rule. 3.6.4 Review the procedure for using a steel measuring tape. 3.6.5 Discuss the advantage of using a wooding folding rule. 3.6.6 Use rulers and measuring tools. 3.6.7 Discuss the importance of taking accurate measurements.
Topic 7: Levels	
Introductory	**Foundation**
	3.7.1 Explain how levels are used to determine whether a surface is level and/or plumb. 3.7.2 Demonstrate how to use and read a spirit level to determine whether a surface is either level and/or plumb. 3.7.3 Demonstrate the procedures for preventing damage to precision instruments.

Topic 8: Squares	
Introductory	**Foundation**
	3.8.1 Discuss the types of squares used for marking, checking and measuring. 3.8.2 Explain how squares are used to check the squareness of adjoining surfaces. 3.8.3 Demonstrate how to use a try square to lay out cutting lines, check a joint to make sure it is square, and check a planned piece of lumber to see whether it is warped or cupped. 3.8.4 Discuss the tasks for which a combination square can be used. 3.8.5 Demonstrate how to mark 45- and 90-degree angles using a combination square.
Topic 9: Plumb Bob	
Introductory	**Foundation**
	3.9.1 Explain how a plumb bob uses gravity. 3.9.2 Explain how to determine whether a line is vertical. 3.9.3 Demonstrate how to hang a plumb bob and accurately mark the point below the tip of the bob. 3.9.4 Discuss the consequences of dropping the plumb bob on its point.
Topic 10: Chalk Lines	
Introductory	**Foundation**
	3.10.1 Explain how to use a chalk line to mark a line. 3.10.2 Demonstrate how to use a self-chalker/plumb bob to mark the line between two points. 3.10.3 Discuss that damp or wet chalk is unusable.
Topic 11: Bench Vises	
Introductory	**Foundation**
	3.11.1 Explain how vises enable one person to do work that would normally require two people. 3.11.2 Discuss the consequences of using a hammer to tighten the handle of a bench vise. 3.11.3 Explain how to properly use a vise to avoid damage to the vise and the object it is holding.
Topic 12: Clamps	
Introductory	**Foundation**
	3.12.1 Identify the various types and sizes of clamps. 3.12.2 Explain procedures for maintaining and safely using clamps.

Topic 13: Saws	
Introductory	**Foundation**
	3.13.1 Identify the differences among the types of saws. 3.13.2 Explain how shape, number, and pitch of teeth make it possible to cut different materials. 3.13.3 Discuss the classifications used for handsaws. 3.13.4 Recognize that the fewer teeth per inch (tpi), the coarser and faster the cut. 3.13.5 Explain how to cut across the grain of wood. 3.13.6 Demonstrate making a straight cut using a variety of crosscut and ripsaws. 3.13.7 Use safety procedures when working with handsaws.
Topic 14: Files and Rasps	
Introductory	**Foundation**
	3.14.1 Discuss the various types of files and rasps and explain how they are used to shape material. 3.14.2 Demonstrate how to choose a file or rasp to fit the area and material you are filing. 3.14.3 Discuss the various file classifications and their uses. 3.14.4 Demonstrate filing techniques. 3.14.5 Explain that, if not cared for properly, files will become unusable. 3.14.6 Perform maintenance procedures for working with files.
Topic 15: Chisels and Punches	
Introductory	**Foundation**
	3.15.1 Explain how chisels are used to cut and shape wood, stone, or metal. 3.15.2 Demonstrate how to use a wood chisel to make a notch in wooden material. 3.15.3 Demonstrate how to use a cold chisel to cut metal rivets. 3.15.4 Compare center, prick, and tapered punches. 3.15.5 List the guidelines for working with punches and chisels. 3.15.6 Explain how to verify whether a chisel's blade is beveled at the correct angle. 3.15.7 Discuss problems that can result from using a chisel with a mushroom-shaped head.

Topic 16: Wrenches	
Introductory	**Foundation**
	3.16.1 Identify the different types of nonadjustable wrenches. 3.16.2 Compare the types of wrenches and how they are used. 3.16.3 Explain when it is appropriate to use a striking wrench and how to avoid damaging screw threads and bolt heads. 3.16.4 Demonstrate how to select the correct size wrench according to the nut or bolt size. 3.16.5 Explain how pipe, spud, and crescent wrenches can be adjusted. 3.16.6 Demonstrate selecting and using adjustable wrenches. 3.16.7 Explain the types of problems that can occur if the jaws are improperly adjusted. 3.16.8 Discuss the procedures for maintaining and safely using wrenches.
Topic 17: Sockets and Ratchets	
Introductory	**Foundation**
	3.17.1 Discuss the role of sockets and ratchets. 3.17.2 Identify the level on a ratchet handle, and explain how it can be used to change the turning direction. 3.17.3 Explain the procedures to use sockets and ratchets.
Topic 18: Torque Wrenches	
Introductory	**Foundation**
	3.18.1 Explain how torque wrenches measure resistance to turning. 3.18.2 Demonstrate how to determine and set the desired number of inch-pounds or foot-pounds of torque. 3.18.3 Demonstrate torque sequence and tightening bolts using a torque wrench. 3.18.4 Identify the formula to determine the correct torque. 3.18.5 Demonstrate how to calculate torque when using an adaptor. 3.18.6 Discuss the importance of following the manufacturer's recommendations when using a torque wrench.
Topic 19: Wedges	
Introductory	**Foundation**
	3.19.1 Explain how wedges can be used to lift and separate objects. 3.19.2 Demonstrate how to use the wedges to lift and separate a variety of objects.

Topic 20: Utility Knives	
Introductory	**Foundation**
	3.20.1 Discuss the uses of a utility knife. 3.20.2 Demonstrate how to make a straight cut with a utility knife. 3.20.3 Explain that a utility knife should never be used on live wires. 3.20.4 Discuss basic safety procedures.
Topic 21: Chain Falls and Come-Alongs	
Introductory	**Foundation**
	3.21.1 Explain how chain falls and come-alongs are used to move heavy loads. 3.21.2 Identify the parts of a manual chain fall. 3.21.3 Identify each part of a manual chain fall and explain how it is used. 3.21.4 Explain how to use a ratchet handle to move a load using a come-along. 3.21.5 Discuss the consequences of using a come-along for vertical overhead lifting. 3.21.6 Discuss the guidelines for maintaining and safely using chain falls and come-alongs. 3.21.7 Recognize that a qualified person must ensure that the support rigging can handle the load.
Topic 22: Wire Brushes	
Introductory	**Foundation**
	3.22.1 Explain how wire brushes are used to clean tools and metal hardware. 3.22.2 Demonstrate how to select the appropriate brush and practice cleaning the hand tools. 3.22.3 Explain why wire brushes should not be used for finishing work.
Topic 23: Shovels	
Introductory	**Foundation**
	3.23.1 Identify the basic shapes of shovel blades and how each is used. 3.23.2 Explain how to select the appropriate shovel for a specific task.

Standard 4: Power Tools - identify and use power tools commonly used in the construction trades.	
Topic 1: Electric, Pneumatic, and Hydraulic Tools	
Introductory	**Foundation**
	4.1.1 Identify the three categories of power tools, and explain how each is powered. 4.1.2 Discuss general safety issues.
Topic 2: Power Drills	
Introductory	**Foundation**
	4.2.1 Identify the different types of power drills. (i.e. electric, cordless, hammer drill, electromagnetic, pneumatic.) 4.2.2 Identify the safety guidelines for working with the various drills.
Topic 3: Saws	
Introductory	**Foundation**
	4.3.1 Identify the different types of power saws. (i.e. circular, saber, reciprocating, portable band saw, jigsaw) 4.3.2 Identify the safety guidelines for working with the various saws.
Topic 4: Grinders and Sanders	
Introductory	**Foundation**
	4.4.1 Identify the different types of grinders and sanders. 4.4.2 Identify the safety guidelines for working with the various grinders and sanders.
Topic 5: Miscellaneous Power Tools	
Introductory	**Foundation**
	4.5.1 Identify miscellaneous power tools (i.e. pneumatically powered nailer, pavement breaker, and hydraulic jack). 4.5.2 Identify the safety guidelines for working with misc. power tools.

Standard 5: Introduction to Blueprints	
Topic 1: Introduction basic blueprint terms, components, and symbols	
Introductory	**Foundation**
	5.1.1 Compare early blueprint designs with a blueprint created by computer-aided drafting (CAD) 5.1.2 Discuss the advantages of CAD-generated drawings over hand-drawn blueprints. 5.1.3 Explain that blueprints and specifications dictate what is to be built and what materials are to be used. 5.1.4 Discuss the importance of being able to read blue-prints. 5.1.5 Explain how contour lines on a civil plan show the contours of the earth. 5.1.6 Identify construction features illustrated on the drawing. 5.1.7 List the different types of information that are included in floor and roof plans. 5.1.8 Explain how elevation drawings are used to illustrate side views and building interiors. 5.1.9 Discuss the types of details that are included in section and detail drawings. 5.1.10 Explain how to locate section and detail drawings in the blueprint plan. 5.1.11 Demonstrate how to interpret the information on door, window, and hardware schedules. 5.1.12 Explain how to translate the information in the general notes on a structural plan. 5.1.13 Discuss the types of information that are included on foundation and structural plans. 5.1.14 Explain how structural section drawings illustrate connections and attachments of accessories. 5.1.15 Identify the general notes that are typically included on a mechanical plan. 5.1.16 Explain how general notes on a mechanical plan are used to determine the location of grilles and registers. 5.1.17 Identify symbols and abbreviations on a mechanical plan. 5.1.18 Discuss the importance of being able to accurately interpret symbols and abbreviations. 5.1.19 Explain why piping and instrument drawings are not drawn to scale. 5.1.20 Discuss the need for separate heating, ventilating, and air conditioning plans. 5.1.21 Identify the layouts that are illustrated on plumbing/piping plans. 5.1.22 Explain how isometric drawings are used to depict plumbing systems. 5.1.23 Discuss the advantage of using a separate electrical plan rather than including the information on the floor plan. 5.1.24 Specify the information included in an electrical plan's general notes. 5.1.25 Identify symbols and abbreviations used on an electrical plan.

	5.1.26 Compare the electrical legend and abbreviations with the mechanical legend and abbreviations. 5.1.27 Locate information on a set of specifications. 5.1.28 Discuss the information that is included in a request for information. 5.1.29 Provide examples of discrepancies that should be reported to the foreman.
Topic 2: Components of the Blueprint	
Introductory	**Foundation**
	5.2.1 Label the five parts of a blueprint. 5.2.2 Discuss the information included in a title block. 5.2.3 Explain the two main purposes of a title block. 5.2.4 Locate a title block on a sample blueprint. 5.2.5 Distinguish between a blueprint's border and its drawing area. 5.2.6 Explain why a border is necessary. 5.2.7 Explain where and how revisions should be included on a blue print. 5.2.8 Discuss the importance of using the latest version of blueprint. 5.2.9 Demonstrate how to interpret the legend on a blueprint and how to use it to locate information about the plan's design.
Topic 3: Scale	
Introductory	**Foundation**
	5.3.1 Discuss the factors that affect the type of scale used on a drawing. 5.3.2 Explain why approximate sizes are not enough for construction. 5.3.3 Discuss the consequences of failing to use a drawing's written dimensions. 5.3.4 Explain when and how to use an engineer's scale. 5.3.5 Demonstrate how to read an architect's scale from left to right or from right to left. 5.3.6 Compare the metric scale with the architect's and engineer's scales. 5.3.7 Demonstrate how to draw and measure lines on blueprints on an engineer's and architect's scale.
Topic 4: Lines of Construction	
Introductory	**Foundation**
	5.4.1 Identify the lines commonly used on blueprints. 5.4.2 Identify and label each of the lines of construction used on drawings in sample blueprints.

Topic 5: Abbreviations, Symbols, and Keynotes	
Introductory	**Foundation**
	5.5.1 Define the abbreviations commonly used on blueprints. 5.5.2 Recognize that abbreviations should always be written in capital letters. 5.5.3 Demonstrate writing common abbreviations for a hypothetical set of plans. 5.5.4 Demonstrate writing a list of abbreviations as they might appear on a title sheet. 5.5.5 Explain that there are unique sets of symbols for architectural, civil, structural, mechanical, plumbing and electrical plans. 5.5.6 Compare keynotes with symbols. 5.5.7 Discuss the advantages and disadvantages of using keynotes.
Topic 6: Using Gridlines to Identify Plan Locations	
Introductory	**Foundation**
	5.6.1 Explain how to use a gridline to identify plan locations. 5.6.2 Locate items on a blueprint that uses a gridline system in bays.
Topic 7: Dimensions	
Introductory	**Foundation**
	5.7.1 Compare the exterior and interior dimensions on a pipe. 5.7.2 Discuss the importance of understanding how to read dimensions on construction drawings. 5.7.3 Identify measurements on a blueprint and specify if they are internal or external measurements.

Standard 6: Basic Communication Skills	
Topic 1: Foundations of Communication	
Introductory	**Foundation**
	6.1.1 Demonstrate the ability to interpret information and instructions presented in written and verbal form. 6.1.2 Demonstrate the ability to communicate effectively in job situations using written and verbal skills.
Topic 2: Reading and Writing Skills	
Introductory	**Foundation**
	6.2.1 Discuss the importance of reading on the job. 6.2.2 List the Five C's of good writing (complete, clear, concise, correct, and consider the reader).
Topic 3: Listening and Speaking Skills	
Introductory	**Foundation**
	6.3.1 Discuss skills for active listening. 6.3.2 Discuss the importance of speaking clearly. 6.3.3 Explain the importance of communicating in a professional manner.

Standard 7: Basic Employability Skills	
Topic 1: Foundations of Employability	
Introductory	**Foundation**
	7.1.1 Describe the employability skills needed in a successful company. 7.1.2 Explain that successful companies lead to a strong U.S. economy.
T**opic 2: The Construction Business**	
Introductory	**Foundation**
	7.2.1 Discuss the importance of a construction business and organizational structure. 7.2.2 Explain entrepreneurship.
Topic 3: Critical Thinking Skills - demonstrate critical thinking skills and the ability to solve problems using those skills.	
Introductory	**Foundation**
	7.3.1 Explain how critical thinking skills can be used to solve problems effectively and draw conclusions. 7.3.2 Describe barriers to effective problem solving. 7.3.3 Discuss the importance of problem solving and using critical thinking skills. 7.3.4 Discuss the problems with planning and scheduling.

Standard 7: Basic Employability Skills	
Topic 4: Computer Skills - demonstrate knowledge of computer systems and explain common uses for computers in the construction industry.	
Introductory	**Foundation**
	7.4.1 Identify the components and terms of a computer. 7.4.2 Examine software packages commonly used in the construction industry. 7.4.3 Demonstrate how to use email.
Topic 5: Relationship Skills	
Introductory	**Foundation**
	7.5.1 Describe the importance of maintaining positive working relationships with co-workers. 7.5.2 Discuss the importance of self presentation skills. 7.5.3 Discuss techniques for appropriate conflict resolution on the job site. 7.5.4 Explain why it is important to be able to give and receive criticism. 7.5.5 Discuss the concept of teamwork and explain how teamwork is integral to construction work. 7.5.6 Discuss the various styles of leadership.
Topic 6: Workplace Issues	
Introductory	**Foundation**
	7.6.1 Discuss the types of harassment that may be present on the worksite. 7.6.2 Discuss the various types of alcohol and drug abuse due to work related stress.